Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

Journal of the Society of Arts.

*FRIDAY, APRIL* 10, 1863.

## THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following circular, with an abstract of the proceedings of the General Meeting held on the 7th Feb., has been issued to the members:—

Society of Arts, Adelphi, London, W.C., Feb., 1863.

Sir,—I am directed to bring to your notice the subjoined proceedings of a Special General Meeting of this Society, held on Saturday, the 7th instant.

Should you desire to have your name placed on the list of subscribers, I shall feel obliged by your filling in the accompanying paper, and returning it to me, with your subscription, which may be in the form of a post-office order or cheque, made payable to the Financial Officer, Mr. Samuel Thomas Davenport, and crossed Coutts and Co. I am, Sir, your obedient servant,

P. LE NEVE FOSTER, *Secretary.*

The subscription of each member is limited to one guinea.

The following additional names have been received up to the 9th inst.:—

| | | | |
|---|---|---|---|
| Acland, Henry Wentworth D., M.D. | 1 | 1 | 0 |
| Acland, Sir Thomas Dyke, Bart., F.R.S. | 1 | 1 | 0 |
| Acland, Thomas Dyke | 1 | 1 | 0 |
| Alexander, Francis | 1 | 1 | 0 |
| Allhusen, Christian | 1 | 1 | 0 |
| Ash, George Claudius | 1 | 1 | 0 |
| Bainbridge, Robert Walton | 1 | 1 | 0 |
| Barnett, Miss M. G. | 1 | 1 | 0 |
| Barron, Frederick | 1 | 1 | 0 |
| Barron, W. J. | 1 | 1 | 0 |
| Bell, J. Lowthian | 1 | 1 | 0 |
| Bennoch, Francis | 1 | 1 | 0 |
| Birt, Jacob | 1 | 0 | 0 |
| Bohn, Henry George | 1 | 1 | 0 |
| Bolckow, Henry | 1 | 1 | 0 |
| Boyes, John | 1 | 1 | 0 |
| Bradley, John | 0 | 10 | 0 |
| Brooke, Thomas | 1 | 1 | 0 |
| Buchan, John Hitchcock | 1 | 1 | 0 |
| Buckley, Lieut.-General M.P. | 1 | 1 | 0 |
| Burn, R. Scott | 1 | 1 | 0 |
| Butter, Henry | 1 | 1 | 0 |
| Campbell, James | 1 | 1 | 0 |
| Chadwick, Edwin, C.B. | 1 | 1 | 0 |
| Challis, J. H. | 1 | 1 | 0 |
| Challoner, Colonel, C.B. | 1 | 1 | 0 |
| Churchward, Captain, J. G. | 1 | 1 | 0 |
| Clabburn, William H. | 0 | 10 | 6 |
| Clark, Rev. Samuel | 1 | 1 | 0 |
| Clarke, J. B. | 1 | 1 | 0 |
| Clarke, Robert | 1 | 1 | 0 |
| Clayton, Nathaniel | 1 | 1 | 0 |
| Clowes, George | 1 | 1 | 0 |
| Coles, William Fletcher | 1 | 1 | 0 |
| Collie, Alexander | 1 | 1 | 0 |
| Combe, James... | 1 | 1 | 0 |
| Cooper, Sir Daniel, Bart. | 1 | 1 | 0 |
| Cooper, David | 1 | 1 | 0 |
| Cooper, Henry | 1 | 1 | 0 |
| Copland, James, M.D., F.R.S. | 1 | 1 | 0 |
| Coutts, Miss. A. Burdett | 1 | 1 | 0 |
| Cowie, Rev. B. Morgan | 1 | 1 | 0 |
| Creswell, A. J. Baker | 1 | 1 | 0 |
| Day, C. A. | 1 | 1 | 0 |
| Davison, Robert, C.E. | 1 | 1 | 0 |
| De la Grangerie, Chevalier Dardenne | 1 | 1 | 0 |
| De la Rue, Warren, F.R.S. | 1 | 1 | 0 |
| Dixon, James | 1 | 1 | 0 |
| Dixon, Thomas | 0 | 10 | 6 |
| Driver, Henry | 1 | 1 | 0 |
| Duppa, Duppa | 1 | 1 | 0 |
| Eavestaff, W. G. | 1 | 1 | 0 |
| Edgworth, Thomas | 1 | 1 | 0 |
| Edwards, William | 1 | 1 | 0 |
| Falcke, David | 1 | 1 | 0 |
| Fenn, Joseph | 1 | 1 | 0 |
| Fenn, Joseph, jun. | 1 | 1 | 0 |
| Figgins, James, jun. | 1 | 1 | 0 |
| Fisher, Joseph Charles | 1 | 1 | 0 |
| Fraser, James William | 1 | 1 | 0 |
| Frith, John Griffith | 1 | 1 | 0 |
| George, John | 1 | 1 | 0 |
| Gretton, John | 1 | 1 | 0 |
| Harrison, William, F.G.S. | 1 | 1 | 0 |
| Harvey, Capt. John, R.N. | 1 | 1 | 0 |
| Healey, Edward | 1 | 1 | 0 |
| Hewlett, Alfred | 1 | 1 | 0 |
| Higgs, Samuel | 1 | 1 | 0 |
| Holland, William | 1 | 1 | 0 |
| Horne, Henry | 1 | 1 | 0 |
| Hunt, John | 1 | 1 | 0 |
| Hunt, Thomas | 1 | 1 | 0 |
| Iselin, John Frederick | 1 | 1 | 0 |
| Johnstone, James | 1 | 0 | 0 |
| Jones, James Patershall | 1 | 1 | 0 |
| Kay, John Robinson | 1 | 1 | 0 |
| Keeling, Edward Henry | 1 | 1 | 0 |
| Keeling, Henry L. | 1 | 1 | 0 |
| Kelly, Sir Fitzroy, M.P. | 1 | 1 | 0 |
| Kennedy, John | 1 | 0 | 0 |
| Kirtley, Matthew | 1 | 1 | 0 |
| Klaftenberger, Charles I. | 1 | 1 | 0 |
| Land, John | 0 | 10 | 6 |
| Lazard, Edward | 1 | 1 | 0 |
| Leigh, Evan | 1 | 1 | 0 |
| Litchfield, John | 1 | 1 | 0 |
| Losada, J. R de | 1 | 1 | 0 |
| Low, Robert | 1 | 1 | 0 |
| Mackay, Thomas Miller | 1 | 1 | 0 |
| Makin, Edwin John | 1 | 1 | 0 |
| Martin, Rev. Samuel | 1 | 1 | 0 |
| Monk, Frederick W. | 1 | 1 | 0 |
| Montefiore, Nathaniel | 1 | 1 | 0 |
| Morley, Samuel | 1 | 1 | 0 |
| Neilson, Walter Montgomerie | 1 | 1 | 0 |
| Oakley, J. Jeffryes | 1 | 1 | 0 |
| Obbard, Robert | 1 | 1 | 0 |
| Page, Thomas, M.Inst.C.E. | 1 | 1 | 0 |
| Paine, Mrs. Caroline | 1 | 1 | 0 |
| Paxton, Sir Joseph, M.P. | 1 | 1 | 0 |
| Prescott, W. G., F.G.S. | 1 | 1 | 0 |
| Purling, Charles | 0 | 10 | 6 |
| Radford, William T., M.D. | 1 | 1 | 0 |

| | | | |
|---|---|---|---|
| Richardson, F. | 1 | 0 | 0 |
| Richardson, Thos. | 1 | 1 | 0 |
| Roberts, David, R.A. | 1 | 1 | 0 |
| Roskell, Robert | 1 | 1 | 0 |
| Strong, Rev. William | 1 | 1 | 0 |
| Twining, Samuel Harvey | 1 | 1 | 0 |
| Winsor, Frederick Albert | 1 | 1 | 0 |

## SEVENTEENTH ORDINARY MEETING.

### Wednesday, April 5, 1863.

The Seventeenth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 8th inst., Peter Graham, Esq., Member of Council, in the chair.

The following candidates were proposed for election as members of the Society:—

| | |
|---|---|
| Benbow, Vernon | 69, Russell-square, W.C. |
| Carter, Robert | 41, Victoria-street, Westminster, S.W., and The Grove, Epsom. |
| Cavell, Edward Strutt | 6, Great Coram-street, and 5, Gray's-inn-square, W.C. |
| Child, Henry William Grace | 27, Scarsdale-villas, Kensington, W. |
| Heaton, Clement | 24a, Cardigan-street, Hampstead-road, N.W. |
| Mappin, Joseph C. | Clapham-park, S. |
| Ridsdale, Joseph | Montpelier House, Tufnell-park, N. |
| Tunstall, Wm. Croudson. | Gloucester. |

The following Candidates were balloted for and duly elected members of the Society:—

| | |
|---|---|
| Beech, Thomas | 6, Russell-place, Old Kent-road, S.E. |
| Beevor, Charles | 41, Upper Harley-street, W. |
| Bell, Alexander | 18, Harrington-square, N.W. |
| Carpenter, William | 8, Brunswick-square, W.C. |
| Perkins, George | Chipsted-place, Sevenoaks. |

The Paper read was—

## ON THE SEWING MACHINE: ITS HISTORY AND PROGRESS.

By Edwin P. Alexander.

Impressed with the national and social importance of the sewing machine as one of the most valuable of the numerous labour-saving machines of the nineteenth century, I approach my subject with some diffidence, and regret, for your sakes, that abler hands than mine have not been deputed to bring it before this Society.

Such information, however, as I possess on the subject in question I gladly place at your disposal; and if I shall succeed in throwing any light upon the nature and merits of these indefatigable little seamstresses, I shall consider my labours have not been in vain. I appear before you this evening, not as the champion of any one in particular of the numerous varieties of sewing machines, but rather as an humble exponent of their general construction and *modus operandi.*

I propose, firstly, to trace the origin of the sewing machine; secondly, to explain the leading features of those varieties most generally adopted; and, thirdly, to lay before you a few statistical returns showing the rapid development of the art of machine sewing, and its important bearing upon the social well-being of a large portion of the community.

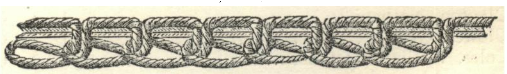
Although the art of sewing and embroidering is one of the most ancient of all arts, it is an astonishing fact that no successful attempt at its accomplishment by the aid of machinery was made until the commencement of the present century.

In tracing the origin of the sewing machine, a passing glance at some of the earlier efforts of inventors in this direction will be necessary, premising that to those efforts we are possibly to some extent indebted for the subsequent combinations of mechanism to which I shall presently have occasion to call your attention. Although apparently complicated, the sewing machine is in reality a very simple piece of mechanism. Its essential features are, first, a needle or hook for carrying a thread through the material, combined with apparatus for maintaining a proper degree of tension on the thread and for securing and tightening the stitch. Secondly, holding surfaces for supporting the material against the thrust and withdrawal of the needle at the immediate part where the stitch is being produced. Thirdly, adjustable self-acting mechanism for propelling or feeding the material under the needle as fast as each stitch is completed.

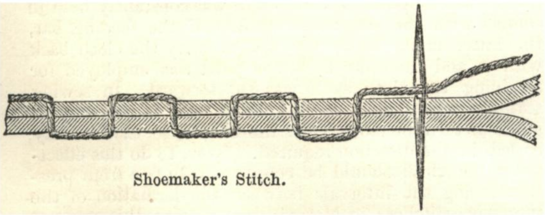
Prior to the existence of the first practical sewing machine the embroidering machine was well known, several ingenious contrivances having been proposed, and in some cases brought into practical operation, for embroidering or tambouring ornamental devices upon woven fabrics.

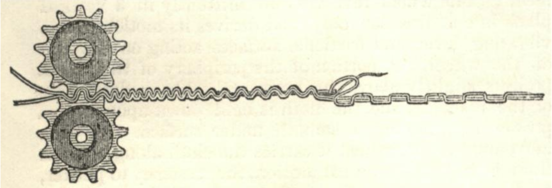
Attempts had also been made at the production of a sewing machine. In the embroidering machine a number of needles or hooks, each supplied with a separate thread, are caused to enter and leave the fabric simultaneously. The fabric is stretched over an open frame, which either receives a compound motion from special machinery governed by pattern surfaces, or is guided direct by the hand of the operator, so as to describe a course corresponding to the pattern to be embroidered, consequently, as many repeats of this pattern are simultaneously produced as there are needles in the machine. After each stitch is made the fabric is moved a step onwards equal to the desired length of stitch, but always in the course or direction of the figure to be produced.

The first embroidering machine was invented in 1804, by John Duncan, a manufacturer of Glasgow. He employed a number of barbed or hooked needles, which, after penetrating the fabric, were supplied with thread and then withdrawn, each needle drawing with it a loop of thread through the fabric and through the previous loop. In Bock's machine of 1829 (better known, perhaps, as Heilmann's), the needles (of which about 150 were employed) had each an eye in the middle, and were pointed at both ends in order to obviate the necessity for reversing them after each passage through the fabric, for, unlike Duncan's, they were passed entirely through the fabric at each stitch, every needle being provided with a needleful or definite length of thread, in place of being supplied continuously from bobbins. An ingenious arrangement of pincers or nippers was employed on each side of the fabric for holding the several needles, and inserting and withdrawing them; in fact, we have here a very close imitation of the operation of hand-embroidering, substituting mechanical fingers for those supplied by nature. The double-pointed needle employed by Bock was patented in this country by Charles Frederick Weisenthal, in 1755, for hand embroidery. A Frenchman, of the name of Thimonnier, invented, in 1830, a machine for producing the tambour or chain stitch in gloves, by means of a hooked needle. It was not found to be of any practical utility, and was soon cast aside. In 1835, Walter Hunt, of New York, occupied himself with the construction of a sewing machine, and was, I believe, the first to employ two continuous threads, producing what is now known


Chain or Tambour Stitch.

as the shuttle or lock-stitch, but he did not succeed in making a practically useful machine, and it was not until fifteen years after that the experiments were brought before the public on the occasion of certain law proceedings instituted by Elias Howe. In 1841 Messrs. Newton and Archbold patented a machine, which was subsequently put into practical use for embroidering the backs of gloves. The needles were made with an eye near the point, and operated in combination with hooks for catching the loops of thread passed upwards through the glove, and holding them in a suitable position for the passage through them of the succeeding loops, thus producing the chain-stitch. The gloves were contained in open metal frames or clamps, to which a self-acting step-by-step movement in one direction only was imparted at every stitch. One of the first sewing machines protected by patent in America was invented in 1842, by John Greenough, of the United States. This machine was intended for heavy leather work, but I cannot learn that it was ever put into practical operation. The sewing was to be produced by a thread passed through the material from opposite sides alternately by the aid of a double-pointed needle, worked by mechanical fingers or nippers, as in Heilmann's machine. This stitch was called the "shoemaker's stitch." Another variety of sewing machine (the first of its kind) was intended for producing a running or basting stitch similar to that made by hand. It was patented in the United States in 1843, and introduced here and patented in 1844, by Leonard Bostwick.

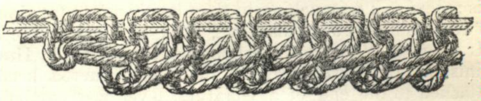

Shoemaker's Stitch.


Running Stitch.

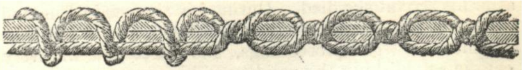
In this machine the fabric is crimped or corrugated by passing between a pair of geared-toothed wheels or crimpers, the folds so formed being pushed on to the needle, which is held stationary between the wheels. It is singular that, although the specification of Bostwick described a machine perfectly adapted for the purpose, it was not introduced into use in this country until a similar machine had been repatented by Morey in 1849, when Messrs. Mather and Platt, of Manchester, under Morey's license, made and introduced several hundreds of them for sewing together piece goods in bleach and dye works, and the same machine was also, at a later period, largely sold in Nottingham for attaching lace edgings to lace goods, for which they are well adapted, although the want of firmness and security in the stitch precludes their use for other purposes.

I now come to two fabric-ornamenting machines, which bear more closely upon my subject than any other of this class; I refer to Fisher and Gibbons' machines, patented the 7th of December, 1844. These are the first embroidering machines wherein it was proposed to employ two continuous threads interlooped or locked together for producing stitches, all the prior machines being adapted simply to the use of a single thread, either interlooped with itself as in Duncan's and Thimonnier's machine, or drawn entirely through the fabric from opposite sides alternately, as in Heilmann's and Greenough's machines.

These ingenious machines were entirely worked out and constructed by Mr. John Fisher, of Nottingham, and reflect great credit upon so young a mechanic, he being only 19 years of age at the completion of his arduous labours. Fisher was the inventor of the peculiar stitch now so well known as the Grover and Baker "knotted" or double-loop chain-stitch, but he merely applied it to the purposes of ornamenting fabrics. Had he but turned his attention at that time, as I believe he subsequently did, to the production of a sewing machine, there is little doubt that with the knowledge he then possessed his efforts would have been crowned with success, and England would have gained the honour of giving birth to the sewing machine.


Knotted or Grover & Baker Stitch.

In one of Fisher's machines, which I shall call the looping-machine, the embroidering instruments employed consisted of a number of curved or bow-shaped needles, provided each with an eye near the point and another in the rear of the bend. These needles penetrated the fabric from below upwards, and were supplied with continuous threads from separate reels or bobbins. In conjunction with each needle, and operating above the fabric, there were two other instruments, the one a "looper," which was supplied from a bobbin with a separate thread of its own; the other a hook, for retaining the loop of needle-thread on the looper. The two threads were interlooped together so as to produce a double chain stitch of a highly ornamental character, and admirably adapted for embroidering purposes. In the second machine, which may be designated as the shuttle-machine, the ornamentation was effected by sewing threads, gimp, or yarn, in pattern upon the surface of the fabric to be ornamented, or by sewing a second fabric in pattern upon the first, portions of the second fabric being subsequently cut away between the patterns so as to produce the style of ornamenting known as *appliqué* work. In this machine a shuttle was used in combination with each of the bent or curved needles already described. This shuttle was supplied with thread or ornamenting cord, and traversed to and fro on the surface of the fabric passing through the open loop of the needle thread, which was protruded through the fabric from below upwards by the needle so as to interlock the shuttle thread or cord with the needle-thread. The stitch so obtained is precisely similar in formation to the lock-stitch produced by the sewing machine, but is not so tight, from the fact of there being no tension on the threads. Whilst these various machines were occupying more or less the minds of mechanics and inventors, the dawn of a grander achievement was breaking in America.


Lock or Shuttle Stitch.

In the year 1841, Elias Howe, a native of Cambridge Port, Massachusetts, first conceived the idea of constructing a really practical sewing machine. I know of no higher example of patient industry and perseverance, indeed, I may say, of devotedness to science, than that displayed by Howe in his early career. A young mechanic, only 22 years of age, hardly capable of supporting himself and those most dear to him on his scant earnings, he laboured manfully, in a little garret in his native town, at his self-imposed task during the few hours that were spared to him after the ordinary labours of the day were ended. He became enthusiastic, and although, as he says, he could not devote his attention to the subject during his working hours, he thought upon it when he could, both day and night. It grew upon him till he felt impelled to yield his whole time to it, and being promised assistance by a friend, he devoted himself exclusively to the construction and practical completion of his machine. The result was that in 1845 he perfected his first sewing machine, and, in order to test its practical success, he sewed with it all the principal seams in two suits of clothes. On the 10th of September, 1846, he obtained his patent. The machine in the glass case is a fac-simile of Howe's first sewing machine; it is kindly lent me by Mr. Bennett Woodcroft, to whom it was presented by Howe himself. In Howe's original machine a curved needle attached to the end of a vibrating lever was combined with a reciprocating shuttle for producing the lock-stitch. The needle had an eye near its point, and a groove formed along the upper and under sides, to allow of the thread lying therein and so passing more easily through the cloth. The cloth was attached to pins on the edge of a thin steel rib called a "baster plate," from the fact I presume of its serving the purpose of a basting thread in holding the two thicknesses of material together whilst being stitched. This plate formed a portion of the feed mechanism for propelling the cloth; it was carried along step by step by the teeth of a small pinion which geared into holes made in the baster plate, an intermittent rotatory motion being imparted to the pinion by self-acting mechanism working in concert with the needle and shuttle. This feed motion was found to be defective in many respects, and has since been entirely abolished in all sewing machines. The cloth was held in a vertical position against the side of the shuttle race, by a spring presser-plate at the part where the needle entered. The shuttle was driven to and fro in its race or groove by two strikers, carried on the ends of vibrating arms worked alternately by cams. The most important features embodied in this machine were the adaptation of suitable contrivances for imparting the requisite amount of tension to the needle and shuttle-threads, for taking up the slack formed on the needle thread when the needle enters the cloth, for tightening and drawing up the stitch, and for supporting the cloth against the thrust and withdrawal of the needle. Shortly after obtaining his patent in America, Howe sent over a machine to this country, and disposed of his invention to Mr. William Thomas for a trifling amount.

On the first of December, 1846, Mr. Thomas obtained a patent for the machine in England, soon after which Howe himself arrived here to assist him in adapting the machine to the peculiar kind of work required, namely, stay-making. Howe does not appear to have prospered here, for in the spring of 1849, indebted to a friend for a steerage passage home, he returned to America, poorer if possible than when he left. He found his wife on a bed of sickness and in a state of utter destitution. Ten days after his arrival she died. During his absence in England his patent had been extensively infringed, and in 1850 he commenced legal proceedings, and succeeded in every case in establishing the validity of his patent.

In the course of these proceedings a prior claim to the invention of the sewing machine was set up by Walter Hunt, who was said to have constructed, exhibited, and sold, in 1834 and 1835, shuttle or lock-stitch sewing machines, similar in all essential particulars to Howe's. That Hunt had tried his hand at a lock-stitch sewing machine, and was the inventor of the shuttle or lock-stitch, there is I think no doubt, but it was never satisfactorily proved that such machines were so far perfected as to render them more than abortive experiments. The turning point in Howe's career had now arrived, and fortune soon began to smile upon him. In 1853 he granted his first license, and in 1855 was enabled to regain possession of the whole of his patent, which at one period he had entirely disposed of, in order to meet the pressing demands that were made upon him. His patent rights being finally acknowledged, and his patent prolonged for a term of seven years, he now receives a royalty upon every sewing machine manufactured in the United States, producing an income of upwards of £50,000 per annum!

The parent machine has been blessed with a numerous progeny, of which but few have arrived at maturity. In this country alone upwards of 300 patents for improvements in sewing machines have been applied for, whilst in America 548 patents were obtained up to the end of 1862, and more than 1,200 applications filed. Many valuable improvements have been subsequently introduced into the sewing machine, both by Howe himself and others. The most important of these have relation to the cloth propelling or feeding mechanism, which was the defective part in Howe's original machine. The first step in this direction was made by Messrs. Morey and Johnson, in 1849, who substituted for the baster plate of Howe a horizontal reciprocating bar, having serrations on its upper surface, and working to and fro along the horizontal table or cloth-supporting surface of the machine. The cloth was held down upon the roughened surface of this bar by a spring presser plate, having a smooth under surface to allow the cloth to slip freely from under it when drawn along by the teeth or serrations of the feeding bar during its forward motion. As the cloth was constantly held in contact with the roughened surface of the feeding bar, the latter on its return was apt to carry the cloth back with it, and therefore a claw or pawl was employed for retaining the cloth as it was fed forward. In sewing seams of a constantly varying direction it is necessary to guide or turn the cloth under the needle, so that it may be fed in the direction required. Now, to do this effectually, the cloth should be comparatively free from pressure during the intervals between the formation of the successive stitches; in Morey's arrangement this was not the case. In 1850, Singer, of New York, applied to the sewing machine a wheel or cylinder having a roughened periphery for feeding the cloth, which arrangement is still extensively employed, and known as the "wheel feed." The wheel revolves intermittently in a vertical plane in one direction only, and derives its motion from a vibrating lever and frictional surfaces acting on the rim of the wheel. A portion of the periphery of this wheel projects slightly above the horizontal table or cloth plate of the machine, and the cloth is held down upon it by a presser foot, having a smooth under surface. At each movement of the wheel it carries the cloth along, and, as there is no back or return motion, the tendency to pucker, or draw back the cloth, is prevented. This description of feed is well adapted for straight or slightly curved seams and heavy work, but as the pressure on the cloth is constant, it does not admit of that rapid and free manœuvring of the cloth which is required in ornamental stitching or braiding. This objection has been remedied in some cases by causing the presser foot or plate to rise at each stitch, so as to leave the cloth or material free to be turned or guided in any desired direction. Mr. A. B. Wilson, of the Wheeler and Wilson Sewing Machine Company, brought out, in 1851, the most perfect arrangement of feed-motion for general purposes. The feed in question is known as the "four motion-feed." It consists of a serrated bar similar to Morey's, but in addition to the horizontal to-and-fro movement it receives an up-and-down motion, the horizontal and vertical movements being obtained from separate cams on the driving shaft. The serrated portion of this bar works through an opening in the table or surface upon which the cloth is laid, the latter being held down on the table by a yielding presser plate immediately above the serrations. In propelling the cloth the feeding bar first rises so as to bring its roughened surface in contact with the underside of the cloth, it then moves horizontally forward a certain distance according to the length of stitch desired, and carries the cloth along when it descends below the level of the table, so as to free it entirely from contact with the cloth, and finally returns to its original position in readiness for the next traverse. According to another modification of this "four-motion" principle, the serrated feeding surface occupies the place of the presser plate, and is caused to operate upon the upper surface of the cloth, so that when the feeder rises during its return or back stroke, the cloth will be entirely free from pressure and held in position by the presence of the needle only. This modification is admirably adapted to ornamental stitching, as the cloth can be turned in any direction round the stem of the needle. In all these cloth-propelling mechanisms provision is made for varying the throw of the feeder so as to enable stitches of any desired length to be obtained.

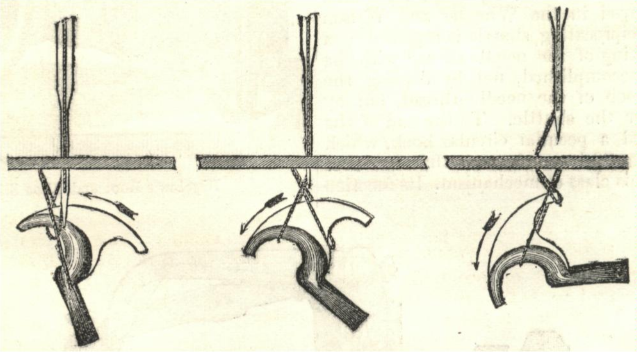
The various sewing machines now in use may be divided into two classes:—

Class 1. Comprising all machines using a single thread.

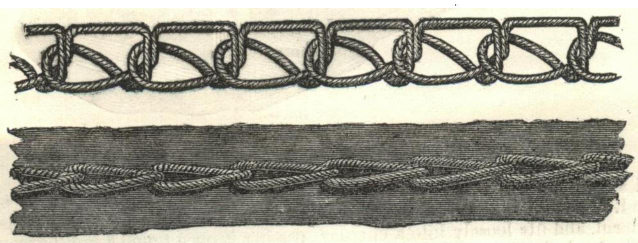
Class 2. Those machines employing two or more threads.

The only machines of any practical utility comprised under class 1 are Willcox and Gibbs' machine, and the waxed thread machines for stitching boot and shoe soles, harness, and other strong leather work. Under class 2 we have the lock-stitch and the "knotted" or double chain-stitch machines. The best examples of lock-stitch machines are those of Wheeler and Wilson, Howe, Singer, and Thomas; whilst for the "knotted" or double chain-stitch machines, the Grover and Baker Sewing Machine Company stands pre-eminent. By the kind permission of their proprietors, Iam enabled this evening to submit for your inspection specimens of all these varieties.

Many attempts have been made at the production of a good single-thread sewing machine, the idea having evidently struck inventors that if a secure seam could be produced from one thread in place of two, an undoubted advantage would be gained, since the fewer the threads and tensions to be regulated and looked after the simpler and cheaper the machine. In 1849, Messrs. Morey and Johnson first brought the chain-stitch sewing machine into something like a practical form, and since that period a host of inventors have worked upon the same idea, but without real success till, in 1857, Mr. Gibbs, of Millpoint, Virginia, without having seen a sewing machine, and knowing nothing of what had been done in that direction, constructed a rude model of a machine, which has since proved itself the best of its class. Having been improved and modified by Mr. Willcox, this machine is now known as the Willcox and Gibbs sewing machine. The sewing is produced by the combination of a straight eye pointed needle, with a peculiar rotating looper in the form of a double hook, having its points in reverse directions. On the stem of the hook there is formed a flattened spur, which serves to cast off and twist the loop; a simple form of under four-motion feed, actuated by a crank pin, serves to propel the fabric, which is held down upon the serrated feeding bar by a yielding presser foot. In the operation of stitching the needle descends and carries a loop of thread through the fabric, which loop is caught by the front hook of the rotating looper and receives a half turn or twist, the stitch produced being a twisted chain stitch, which is more secure than the ordinary chain stitch. The cloth is fed forward and the needle descends again, bringing a second loop with it. This is in turn caught by the front hook, the preceding loop having in the meantime passed into the throat of the rear hook, which gradually withdraws from it, and allows it to be finally released only when it is nearly drawn up into the fabric. The rear portion of the looper which effects this operation is called by the inventor the "tension let off," inasmuch as it maintains a certain amount of tension on the loop after it has been in reality "cast off" from the looping hook, the object being to avoid any "kinking" or entanglement of the loop, which sometimes occurs in running at high speeds, if the cast-off loop be left perfectly slack and uncontrolled. The Willcox and Gibbs machine is exceedingly simple in its construction, and is the fastest and least noisy in its action. It is well adapted for family use, and is largely employed in the trimming trade. It is ordinarily run at



Willcox and Gibbs—Diagrams showing formation of Stitch.



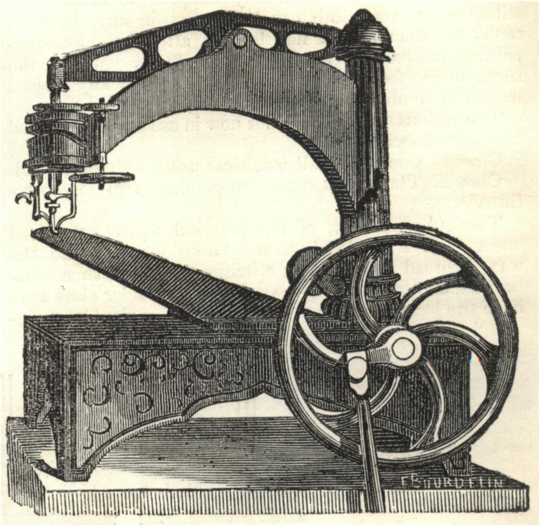
Twisted Chain-stitch.

he rate of 1,500 stitches per minute, but can be worked up to 3,000 or 4,000.

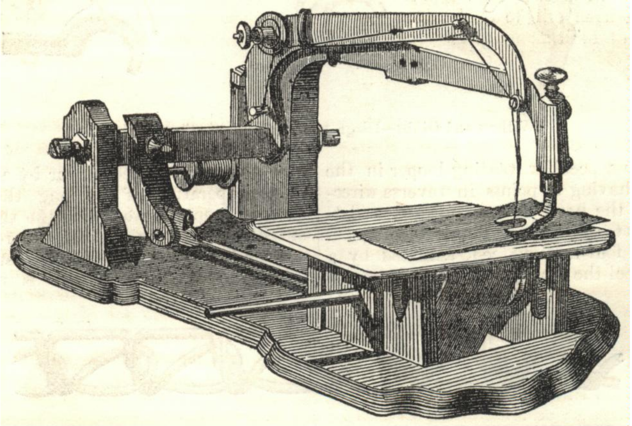
I attribute the former failure of the single-thread chain-stitch machines more to the defective construction of the machines (which were frequently liable to drop stitches) than to the stitch itself, as, when properly made, it will answer for most practical purposes, although it does not possess the stability of the "knotted" and lock-stitches.

In the waxed thread machines the stitch produced is the ordinary chain stitch, a hooked needle being generally employed for introducing the thread. It either descends through the material and draws up a loop of thread which has been supplied to it by a thread-carrier below, or it works from below upwards, and draws the loop down through the material and through the preceding loop. Two excellent examples of waxed thread machines were exhibited by Mr. L. A. Bigelow in the American Department of the International Exhibition. They were adapted for stitching boot and shoe soles to the uppers, and were capable of turning out 150 pairs of boots or shoes per diem.

In all reciprocating shuttle machines a certain loss of power is incurred in driving forward, stopping, and bringing back the shuttle at each stitch, whilst the machines are generally more noisy than those of any other description, owing to the striking of the driver against the shuttle at each fresh start. These objections have been most effectually removed in the Wheeler and Wilson machine, where the reciprocating shuttle is replaced by a stationary one, the locking of the needle thread with the shuttle thread being accomplished, not by driving the shuttle through the loop of the needle thread, but by passing that loop under the shuttle. To the end of the driving shaft is attached a peculiar circular hook, which is one of the most beautiful contrivances that has ever been introduced into this class of mechanism. Its function is to take the loop of thread, which is passed through the fabric by the needle, and carry it under the stationary shuttle, and then cast it off, so as to interlock the two threads, thereby producing the lock-stitch. (See woodcuts, next page.) The cast off loop is retained by a friction loop check until the next loop has been caught by the point of the hook. The shuttle is of a similar construction to the bobbins of a lace machine. It consists of two discs connected by a central axis, upon which, and between the discs, the thread is wound. This shuttle is of about the diameter and thickness of a florin, and fits loosely into a circular recess in the centre of the hook, being retained therein by an adjustable bracket or holder, which allows of sufficient lateral play in the shuttle to admit of the easy passage of the loop of needle thread round it. The only tension apparatus required in this machine is the one for the needle thread, the shuttle thread being always kept sufficiently taut by the tendency of the rotating hook to turn the shuttle, thereby keeping up a proper degree of tension in that part of the thread extending from the shuttle to the fabric. This is undoubtedly a great advantage, as the tensions in a sewing machine are really the most difficult parts to regulate, and, consequently, the fewer their number the easier will be the management of the machine. In this machine the tension of the needle thread is obtained by passing it once round a small grooved pulley, to which any degree of friction is applied by a nut acting upon a volute spring, which bears against one side of the pulley. The cloth is propelled by an under four-motion feed, and is held down thereon by a yielding presser foot, which is capable of being adapted to serve the additional purposes either of a hemmer or braider.

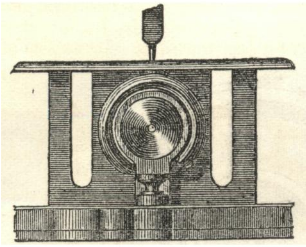


Bigelow's Boot and Shoe Stitching Machine.

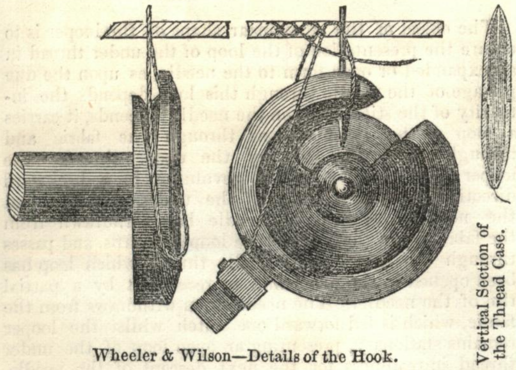


Wheeler and Wilson's Machine.

Having already explained to you Howe's first machine, let me now call your attention to his latest. The Howe sewing machine exhibited to you this evening is one of Elias Howe's most recently improved manufacturing machines, adapted for boot and shoe work, in which trade it is being very extensively employed. In adapting a sewing machine to the stitching of tubular articles, such, for example, as the legs and uppers of boots and shoes, it is necessary to modify the shape of the table or surface which supports the material, so as to admit of a tubular article passing over it; consequently, in place of having a wide, flat table, a narrow and long overhanging arm, or cylinder, is employed, upon which tubular work can be readily adjusted. This form of the cloth-supporting surface is common to all machines intended for the class of work referred to, and is generally known as the "cylinder machine," but the specimen before us contains other specialities, which are worthy of notice. In Howe's cylinder machine, the stitch is produced in a different manner to all other shuttle machines. In every other shuttle machine the needle remains in the material during the passage of the shuttle through the loop of the needle thread, but in this machine the shuttle does not pass through the loop until the needle is withdrawn from the material. The needle pierces the work, and then withdraws a certain distance clear of the material, leaving a loop of its thread behind it, through which loop a reciprocating shuttle passes with the second thread. The needle bar then rises still further, and draws up and tightens the stitch. The sewing produced on this machine has a closer and more regular appearance than that made on an ordinary lock-stitch sewing machine. The platform, or flat table machines, now constructed by Howe, are provided with a simple little contrivance for preventing the breaking of the needle occasioned by the point of the shuttle striking it during its passage, for which purpose a small wedge, actuated by an extra cam, presses against the needle inside the shuttle race, and holds it back clear of the shuttle's point. To obviate the missing of stitches by reason of the shuttle not catching fairly the loop of the needle thread, a deflector, or laterally adjusting needle slide, is employed, by adjusting which the needle may be brought nearer to or further from the side of the shuttle. This arrangement affords facility also for the adaptation of fine or coarse needles to the same machine. When a fine needle is used, the slide will require to be adjusted so as to bring the side of the needle nearer to the shuttle, and if a coarse needle be inserted, then the slide will require to be adjusted in the opposite direction, so that the extra thickness of the needle will present no obstruction to the passage of the shuttle. The tension of the shuttle thread is maintained by a small nipping spring inside the shuttle, in lieu of passing it through holes in the shuttle, as is usually the case, and facility is afforded for regulating the pressure of the presser foot according to the nature of the work. By these simple little contrivances an almost universal machine is obtained, capable of stitching the finest muslin or the strongest materials at the will of the operator.



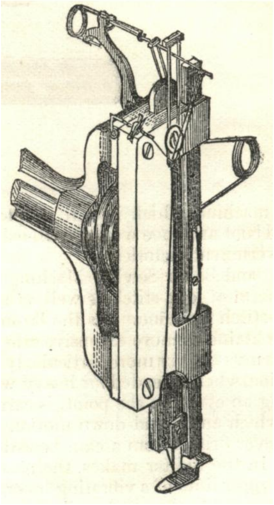
Wheeler & Wilson—Front Elevation of the Hook.



Wheeler & Wilson—Details of the Hook.

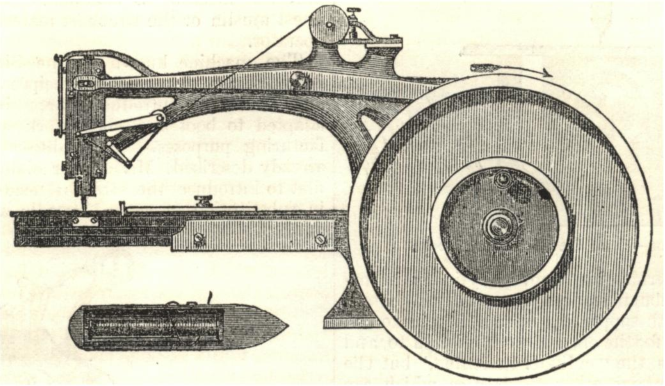
Vertical Section of the Thread Case.

The machine known as the Singer sewing machine is one of the oldest of the reciprocating shuttle variety, and was first introduced here in 1852. It is well adapted to boot and shoe work and all heavy manufacturing purposes. In addition to the wheel feed already described, Mr. Singer claims to have been the first to introduce the straight needle, carried by a slide, in substitution a curved needle attached direct to a vibrating lever arm. For heavy work a straight needle, penetrating perpendicularly through the fabric, is essentially requisite, the curved needle being apt to spring and break when forced through leather and similar strong materials. In light working machines, however, the needle slide is unnecessary, and only entails extra friction and wear and tear of the working parts. The needle slide works in a vertical guide and is driven direct from a crank-pin working in a differential slotted piece attached to the slide. The slack of the needle thread is taken up and the tightening of the stitch effected by a spring lever arm actuated by the needle slide so as to descend and give out sufficient thread for forming the loop when the needle descends, and then to rise and tighten the stitch as the needle ascends.



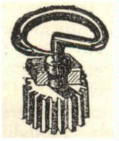
Singer's Take-up Lever Arm.

Since his original patent of 1846 (now expired), Mr. Thomas has introduced several improvements, and, indeed, has completely remodelled the first Howe machine, retaining, of course, its essential features. As now manufactured, the Thomas machine is provided with a needle slide and straight needle, and is furnished with the top *four-motion* feed previously referred to. The needle slide is actuated by a vibrating lever arm worked by a cam groove formed in a disc which serves as the fly-wheel and driving pulley of the machine. The shuttle is carried to and fro along its race, in a direction at right angles to the feed or traverse of the fabric, by means of a forked driver actuated by another cam groove also formed in the fly-wheel. The thread from the bobbin passes through an eye in the end of a short adjustable arm, and thence to an eye in the extremity of an auxiliary lever, which is lifted by a pin in the needle slide at each stitch, and consequently takes up the slack of the thread and tightens the stitch. The object of the adjustable arm is to regulate the amount of thread drawn off the bobbin at each stitch in accordance with the thickness of the material operated upon, it being simply requisite to raise or lower this arm slightly when the variation produced in the angle or direction of the thread causes more or less thread to be drawn off the bobbin at each rise of the auxiliary lever. This machine, which is well adapted for general outfitting and boot and shoe work, is extensively employed in all the Government factories.



Thomas' Machine and Shuttle.

The Grover and Baker Sewing Machine Company construct a new form of lock-stitch as well as a "knotted" or double chain-stitch machine. As the latter description of machine has obtained a more extensive sale in this country I shall confine my remarks more particularly to this variety. In this machine, when intended for heavy work, a straight needle, having an eye near the point, is carried by a vertical slide, to which an up-and-down motion is imparted by a bell crank lever driven from a cam beneath the table or cloth plate. In the lighter makes, the needle is attached direct to the upper limb of a vibrating lever, and is slightly curved to correspond to the arc described by the end of the lever. A vibrating motion is imparted to this lever by a crank pin working in a slot in the front end of the lower limb of the lever beneath the bed plate. In conjunction with the needle there is a second instrument, called a looper, which may be either straight or of a curvilinear form, and is situate below the cloth plate. The needle and looper are each supplied with a thread direct from ordinary reels or bobbins, and consequently the loss of time incurred in the shuttle machine in winding the thread on to the shuttle spool is obviated. The curvilinear looper is provided with an eye at the heel or commencement of the bend, and with a second eye near its point, the part between the two eyes being grooved to receive the thread, which is first passed through the eye at the heel and then through the one at the point. The curvilinear portion of this looper is situate horizontally close under the cloth plate, and a circular reciprocating motion is imparted to it by a segmental rack and pinion, in the heavier class of machines, or by means of a driver having an up-and-down motion along a spiral formed on the vertical spindle or axis of the looper, which is a very beautiful and simple contrivance for the purpose.



Grover and Baker's Curvilinear Looper.

The object of the curvilinear shape of the looper is to ensure the presentation of the loop of the under thread in an expanded or open form to the needle, as upon the due passage of the needle through this loop depends the integrity of the stitch. When the needle descends, it carries a loop of the upper thread through the fabric and through the open loop of the under thread; the looper then makes a partial revolution in a backward direction, leaving a loop of the under thread round the needle. Before the needle has withdrawn from the fabric again the point of the looper returns, and passes through the loop of the needle thread, which loop has been opened in the meantime to receive it by a partial rise of the needle. The needle then withdraws from the fabric, which is fed forward one stitch whilst the looper remains stationary, presenting an open loop of the under thread in readiness for the next descent of the needle. The fabric is propelled by the four-motion feed already described. As an objection has been raised against this machine on the score of its great consumption of thread from the lower reel, it is but fair to point out that this defect is, to a great extent, counterbalanced by the saving obtained from the fact that an entire reel of thread may be used up without loose ends or waste of any kind, excepting at the commencement and termination of the bobbin. In the ordinary shuttle machines, the shuttle spool is necessarily small, and only contains a comparatively short length of thread, and as it is impossible to use up the full quantity in the shuttle, it follows that a portion is wasted both at the commencement and termination of each shuttle-full. The amount of work produced in a given time by these machines is considerably greater than that obtained by the ordinary reciprocating shuttle machines.

By using a thick under thread, a highly ornamental braiding effect is produced on one side of the work, but as this ridge would be objectionable in ordinary sewing, it is avoided by employing a considerably finer thread than that supplied to the needle. I may mention another variety of this machine known as the "Boudoir" machine. It was introduced into this country by Newton Wilson and Co., in 1858, and is specially manufactured for family use only, for which it is admirably adapted. The looper is straight, its loop being opened by a special instrument, and the cloth is propelled by a top feed, having a to-and-fro movement only. This machine may be driven in *either* direction without interfering with its operation. It is, I bebelieve, the first introduced here driven by friction alone, no driving strap being used. There are several sewing machines, chiefly of British manufacture but of American origin, which, although perhaps not so well known as the varieties before us, are, nevertheless, deserving of some notice; amongst these, I may mention the "British Sewing Machine" (a variety of the Wheeler and Wilson machine); the reciprocating shuttle machines of Guinness, Mackenzie, and Simpson; the "knot stitch" machine of Salisbury (producing a lock stitch with twisted loop); and the double chain, or "knotted stitch" machine of Whight and Mann, the leading peculiarity of which is the feeding or propelling of the cloth by a lateral movement of the needle. The French shuttle machines of Callebaut (mostly modifications of, and improvements on Singer's), attracted considerable attention at the International Exhibition last year. To give a description of these machines would occupy too much of your time. All sewing machines are furnished with special appliances for hemming, binding, braiding, tucking, &c.; indeed, there are only two operations they cannot perform satisfactorily, viz:—sewing on buttons and stitching button-holes. A thoroughly practical button-hole machine is much wanted, and would be a fortune to the lucky proprietor.

For a period of five or six years after Howe obtained his original patent, considerable difficulty was experienced in introducing the sewing machine; and it was not until 1851-2 that the sewing machine business can be said to have fairly commenced. In this country and on the Continent, it is, comparatively speaking, even now in its infancy, and no accurate statistical data can be obtained. By bringing to your notice, however, the vast extent of the sewing machine business in the United States, the value of the work done, and the saving of labour effected there, you will be in a position to form some estimate of what the sewing machine is capable of achieving in our own country. In America the number of machines at present in use is estimated at about 300,000, whilst in Great Britain and Ireland, with a considerably larger population, there are probably not more than from 50,000 to 60,000 at work. In America, the manufacture of sewing machines is carried on chiefly by Joint Stock Companies, provided with ample capital and large establishments, where the various parts of the machines are constructed by self-acting tools, thus effecting not only considerable economy in labour, but ensuring an accuracy of workmanship, and beauty of finish, which has never been equalled by our own manufacturers. The amount of capital invested in this business is computed at half a million sterling.

Some of these manufacturing companies employ as many as 500 men, and produce from 300 to 800 machines per week. With us the trade is entirely in the hands of private makers, and contractors, most of whom are in a very small way of business, and £5,000 would be a liberal estimate of the capital invested in plant. There are not more than 12 manufacturing establishments here of any note, and about 100 small workshops, employing two or three mechanics each, the aggregate number of hands engaged in this business being estimated at 500. During the last two years about 20,000 machines have been manufactured in this country, which is little more than one-half the number manufactured by the Wheeler and Wilson Sewing Machine Company alone, in 1860.

The returns of the aggregate annual sales of sewing machines in America, from 1853 to 1859 inclusive, exhibit the rapid growth of this business during the period in question.

| | |
|---|---|
| Machines sold in 1853 | 2,509 |
| ,, ,, 1854 | 4,469 |
| ,, ,, 1855 | 3,513 |
| ,, ,, 1856 | 7,223 |
| ,, ,, 1857 | 12,713 |
| ,, ,, 1858 | 17,589 |
| ,, ,, 1859 | 46,243 |

The superintendent of the census, in his preliminary report to the Secretary of the Interior and Congress on the eighth census, says, "The sewing machine has also been improved and introduced in the last ten years to an extent which has made it altogether a revolutionary instrument. It has opened avenues to profitable and healthful industry for thousands of industrious females, to whom the labours of the needle had become wholly unremunerative and injurious in their effects. Like all automatic powers, it has enhanced the comforts of every class, by cheapening the process of manufacture of numerous articles of prime necessity, without permanently subtracting from the average means of support of any portion of the community. It has added a positive increment to the permanent wealth of the country, by creating larger and more varied applications of capital and skill in the several branches to which it is auxiliary.

"The manufacture of the machines has itself become one of considerable magnitude, and has received a remarkable impulse since 1850. The returns show an aggregate of 116,330 made in nine states in 1860, the value of which was 5,605,345 dols. A single establishment in Connecticut manufactured machines to the value of over 2,700,000 dols., or nearly one half of the whole production of that year. During the year 1861 sewing machines to the value of over 61,000 dols. were exported to foreign countries. It is already employed in a great variety of operations and upon different materials, and is rapidly becoming an indispensable and general appendage to the household.

"Among the branches of industry which have been signally promoted by the introduction of the sewing machine is the manufacture of men's and women's clothing for sale, which has heretofore ranked with the cotton manufactures in the number of hands—two-thirds of them females—and the cost of labour employed. The increase of this manufacture has been general throughout the Union, and in the four cities of New York, Philadelphia, Cincinnati, and Boston, amounted in value to nearly forty and one quarter millions of dollars, or over 83 per cent. of the produce of the whole Union in 1850. The manufacture of shirts and collars, of ladies' cloaks and mantillas—a new branch which has received its principal impulse within the last ten years—and of ladies' and gentlemen's furnishing goods generally, form very large items in the general aggregate of this branch. They severally employ extensive and numerous establishments—many of them in our large cities—with heavy capital. In Troy, New York, the value of shirt collars alone annually manufactured is nearly 800,000 dols., approximating in value to the product of the numerous and extensive iron foundries which have been a source of wealth to that city."

I will now invite your attention to the saving of labour effected by the sewing machine in some of the various departments of manufacture into which it has been introduced in America. (See Tables, next page.) It has been proved, by actual experiment, that one machine will perform the work of at least five seamstresses (in some trades it will do considerably more); allowing one hand to operate the machine, a saving is effected of the wages of the other four. In America, the pay of a needlewoman averages 50 cents a day, consequently we have a clear saving of two dollars a day per machine in wages only.

In the manufacture of ready-made clothing, the estimated saving, in the city of New York alone, is 7,500,000 dollars per annum. In the manufacture of shirt-fronts, which is a distinct branch and carried on to a considerable extent, one machine will produce nearly 100 shirt-fronts per diem, while a seamstress cannot stitch more than six in the same time. In this branch, the saving in New York is estimated at 843,750 dollars per annum.

The manufacture of shirts is another very extensive business, distinct in itself. A single establishment, in New Haven, employs 400 machines, producing 800 dozen shirts per week. The saving in labour, to this house, has been estimated at 240,000 dollars per annum.

In Massachusetts the sewing machine is largely em-

SEWING MACHINES PRODUCED IN THE UNITED STATES DURING THE YEAR ENDING JUNE 1ST, 1860.

| STATES. | Capital invested in real and personal estate in the business. | Value of Raw Material, including fuel. | AVERAGE NUMBER OF HANDS EMPLOYED. | | Cost of Labour. | Number of Machines. | Value. |
|---|---|---|---|---|---|---|---|
| | | | Male. | Female. | | | |
| | Dollars. | Dollars. | | | Dollars. | | Dollars. |
| New Hampshire ......... | 20,350 | 25,160 | 97 | ... | 39,540 | 6,000 | 134,500 |
| Vermont ................. | 25,000 | 8,320 | 40 | ... | 19,200 | 3,500 | 42,000 |
| Massachusetts ... ........ | 253,000 | 61,171 | 509 | 8 | 244,560 | 21,400 | 1,067,300 |
| Rhode Island ........... | 35,000 | 6,745 | 60 | ... | 21,600 | 6,000 | 90,000 |
| Connecticut ............. | 420,000 | 162,450 | 679 | ... | 443,400 | 39,268 | 2,784,600 |
| New York................. | 368,200 | 212,440 | 412 | ... | 132,720 | 27,230 | 1,043,805 |
| Pennsylvania ........... | 212,500 | 52,598 | 240 | 20 | 115,440 | 5,149 | 249,355 |
| Ohio ...................... | 46,200 | 36,072 | 114 | ... | 40,776 | 7,283 | 178,785 |
| Delaware ................. | 10,000 | 2,875 | 15 | ... | 6,000 | 500 | 15,000 |
| Aggregate........... | 1,390,250 | 567,831 | 2,166 | 28 | 1,063,236 | 116,330 | 5,605,345 |

CLOTHING MADE IN THE FOLLOWING STATES DURING THE YEAR ENDING JUNE 1ST, 1860.

| STATES. | Number of Establishments. | Capital invested in real and personal estate in the business. | Raw Material used, including fuel. | AVERAGE NUMBER OF HANDS EMPLOYED. | | Annual Cost of Labour. | ANNUAL PRODUCTS. | |
|---|---|---|---|---|---|---|---|---|
| | | | | Male. | Female. | | Value in 1850. | Value in 1860. |
| | | Dollars. | Dollars. | | | Dollars. | Dollars. | Dollars. |
| Maine ................... | 93 | 352,750 | 940,709 | 258 | 2,218 | 359,324 | 917,311 | 1,632,946 |
| New Hampshire...... | 67 | 144,180 | 334,589 | 136 | 1,046 | 212,664 | 616,233 | 669,044 |
| Vermont ............... | 39 | 72,100 | 131,899 | 83 | 239 | 68,832 | 124,560 | 250,669 |
| Massachusetts......... | 194 | 1,303,100 | 4,084,771 | 1,503 | 3,180 | 1,134,400 | 8,757,156 | 6,440,671 |
| Rhode Island ......... | 65 | 316,700 | 604,831 | 398 | 970 | 268,260 | 422,372 | 1,138,086 |
| Connecticut............ | 57 | 337,000 | 782,105 | 406 | 1,085 | 275,604 | 1,519,433 | 1,338,985 |
| New York ............ | 842 | 8,028,811 | 14,341,094 | 14,576 | 17,732 | 6,265,015 | 16,007,534 | 24,969,852 |
| Pennsylvania ......... | 667 | 5,325,088 | 6,244,185 | 7,776 | 10,152 | 2,911,612 | 6,988,498 | 12,192,603 |
| New Jersey............ | 137 | 1,592,775 | 2,232,145 | 2,224 | 4,922 | 1,164,854 | 2,484,594 | 3,975,436 |
| Delaware.............. | 20 | 69,675 | 102,208 | 64 | 167 | 46,176 | 83,602 | 179,840 |
| Maryland ............ | 148 | 1,266,150 | 1,909,676 | 2,233 | 3,779 | 931,056 | 2,694,377 | 3,256,716 |
| District of Columbia. | 34 | 125,150 | 191,668 | 150 | 177 | 91,860 | 297,900 | 342,798 |
| Ohio..................... | 436 | 3,021,221 | 4,339,684 | 6,348 | 6,848 | 2,264,352 | 2,765,232 | 8,615,329 |
| Aggregate in 12 States & District of Columbia...... | 2,799 | 21,954,700 | 36,239,564 | 36,155 | 52,515 | 15,994,009 | 43,678,802 | 65,002,975 |

ployed in the boot and shoe trade, and its savings are estimated at 7,500,000 dollars per annum.

Of the 300,000 machines in use in America, about 75,000 are employed in private families for domestic sewing; and if we allow thirty days' work in the year to each of these family machines, we have for result a sum of upwards of £900,000, as representing the wages saved in this class of work alone, supposing it to have been done by paid hand labour.

The aggregate annual saving to the United States effected by the sewing machines, with the present number in use, is upwards of £29,000,000; or, in other words, if the whole of the machine sewing now produced in America were to be performed by hand, it would require a sum of upwards of £29,000,000 per annum to pay for the extra labour which would have to be employed.

Although the sewing machine was in practical operation in this country before it had been thoroughly recognised in America, it has received no radical improvement at our hands, all the most important improvements being due to American inventors. Its general introduction here was greatly impeded by the refusal of one of our first patentees to grant licences to make or sell American machines, which by many are preferred to those of English manufacture. Had a more liberal policy been pursued, and licenses granted to all comers at a reasonable rate (which course has been adopted from the first by Howe in America), the sale of machine would have been quadrupled, endless law proceedings avoided, and the profits to the patentee greatly enhanced. In 1860 the patent in question expired, and the public have since then enjoyed the privilege of selecting those machines best adapted to their special requirements, the majority of which are of American manufacture. From these few facts it will be seen that the real trade in sewing machines has only existed here since 1860, which fully accounts for the backward state in which we find it. The sewing machine is now beginning to make its way in various departments of manufacture in this country, whilst a steady increase in the demand for family machines is also showing itself.

Amongst the leading branches of industry which are giving employment to these machines, I may mention the manufacture of shirts, collars, stays, mantles, dresses, under clothing of all kinds, coats, trousers, caps, trimmings, and boots and shoes. In this last-mentioned trade upwards of 3,000 machines are now employed. Of these about 800 are working in Staffordshire, the town of Stafford alone employing from 450 to 500 machines. About 800 are in use in Northampton. In Leicester a trade entirely new to the town has been created through the instrumentality of the sewing machine, about 300 machines being now employed there in the manufacture of boots and shoes. Bristol employs about 250 machines, distributed among five establishments. The towns of Norwich and Ipswich employ about 800 machines, and a new trade in "ready-made uppers" has been created.

Although the introduction of the sewing machine into the boot and shoe trade met with the strenuous opposition of the Trade Union, resulting in a general strike amongst the workpeople, it has since been admitted that its employment in this department of manufacture has given a very marked impulse to the trade generally, and has, in fact, been the salvation to this country of the lighter class of work, enabling us to compete in a most successful manner with the French manufacturers, who had almost gained the entire monopoly of this branch of the trade. It is largely employed by army contractors, both at home and abroad, the clothing of many regiments being entirely made by the sewing machine; indeed, without its assistance, the immense armies which have been lately raised in the Northern and Southern States of America could never have been equipped and sent into the field in the surprisingly short time they were. But the sewing machine has fulfilled a nobler mission in ameliorating the condition of the seamstress by shortening her hours of labour and increasing considerably her earnings. It has called forth new industries in the manufactures of sewing machine needles and of silk twist, both of which are now carried on, to a very considerable extent, as special branches of manufacture, whilst the trades of japanning and plating have been greatly benefited by its agency.

The following noteworthy example of what may be effected by the sewing machine in assisting indigent females, is extracted from a paper read last December by Mr. Seton, advocate, before the Society for the Employment of Women, Edinburgh. The author, after describing the nature of a certain charitable society called the "Register of Benevolence," which receives miscellaneous contributions of clothing, furniture, books, &c., to be supplied to those deserving objects of charity who are diligently, but not always successfully, striving to help themselves, says—"One instance may be given of the way in which other things are made available. Last summer a lady who possessed, but did not use, a sewing machine, offered it to us if it would be of service to any one. It was accepted, as most things are, without knowing what might become of it. Not long after it was applied for, and sent to some ladies in the north, in order that they might ascertain what use a poor girl would make of it before they provided her with one. She had it for six months, and worked it with such success as to support both herself and her mother by her labours. The machine was returned to us a few weeks since, and has now gone to the borders of England on a similar errand." The system of lending sewing machines, either gratuitously or at a nominal rental, is, I think, well worth the consideration of some of our Benevolent Societies, and might possibly be carried out with advantage amongst our suffering sisters in Lancashire, thus making an American invention the means of alleviating the distress occasioned by the derangement of American commerce.

In conclusion, I beg to express my acknowledgments to those gentlemen who have supplied the sewing machines this evening, and to thank them cordially for much valuable information afforded me during the preparation of this paper.

## DISCUSSION.

Mr. **Benjamin Fothergill** (responding to the invitation of the Chairman) said he had come quite unprepared to make any observations upon this interesting and important subject; but having had at an early period of his life something to do with Heilmann's embroidering machines, a great many of which had been in operation for a number of years in Manchester, he could speak as to their success, and could also make some observations with regard to the improvements introduced from time to time into that class of machine. As, however, these were not, properly speaking, sewing machines, he would make no further allusion to them except to remark, that although the needle with the eye in the centre was long known to those connected with the embroidery business, yet they did not appear to appreciate its general applicability. Mr. Alexander had truly said, time would not permit them to go into all the details of the various machines; suffice it to say, with regard to the embroidering machine, that a large number of needles were employed; that there was a wide frame, on which the fabric was stretched, and two travelling carriages, one on each side of the fabric, carrying a number of instruments forming artificial fingers and thumbs, which caught the needles as they passed through, and these being put in motion by the machinery, the pattern required was produced.* With regard to the history of the sewing machine, perhaps Mr. Alexander might not be aware that the Fisher and Gibbons' machine was not only applied to purposes of embroidery, but that it was modified into what Mr. Fisher called a sewing machine. He had a frame, upon which was stretched a couple of pieces of cloth, and the design required to be produced was worked on the fabric in a similar manner to Heilmann's machine. The curved needle, which had been shown to them this evening, perforated the material, a "shogging" motion being imparted to it, so that it might pass easily through. Having described the peculiar action of this machine, Mr. Fothergill went on to remark that three or four years ago, in an action for infringement of patent, Fisher and Gibbons' machine was brought into court as a specimen of the needle and shuttle-sewing, and was worked in the court as a sewing machine. It was at the same time stated in evidence, that when Mr. Fisher had nearly completed his contrivance one or two of his workmen left him, and went to America, and communicated there the idea that was afterwards worked out in the shape of a sewing machine. But whether that was so or not, such was the evidence given before the court on the occasion he referred to, and with regard to Thomas's machine certain portions of the specification were disclaimed because it was demonstrated that Fisher and Gibbons' machine contained many of the same elements. In going through the history of this invention there were various contrivances which, if time permitted, he would have prepared himself to have explained more in detail. He had been appointed one of the jurors in the section which included sewing machines, in the Great Exhibition of last year, but on the second day of his labours he unfortunately met with an accident which prevented his further prosecution of those duties; he would otherwise have been able to have referred more definitely to the points of the various machines exhibited on that occasion. He could, however, confirm the statement made by Mr. Alexander that the admirable contrivance which they saw in the four-motion feed, was one of the results which arose from the difficulty which was at first experienced through the puckering of the material. Mr. Fothergill having given further explanations of the operation of this feed-motion, said he hoped the few remarks he had offered would open the way for the various gentlemen present describing the different contrivances they had introduced in their machines; for he had no doubt each would consider his own machine the best.

Mr. **Hodge** expressed his regret that greater prominence had not been given in the paper to the name of the late Walter Hunt. He gave Mr. Alexander the highest credit for the critical manner in which he had investigated the sewing machine, and it must be admitted that it was an extremely difficult subject to deal with, and one which required much labour to understand thoroughly. He was anxious to have an opportunity of stating that in 1834 Walter Hunt produced a perfect sewing machine, but, like most inventors, being a poor man himself, he entered into partnership with an individual who was to supply the necessary capital for bringing out his invention, and the result was that Hunt got into difficulties with his monied partner, a law suit took place, and it ended in Hunt locking up his ideas and knocking his machine to pieces. He subsequently went on inventing various kinds of machinery, and his memory was much revered in the United States. He merely referred to these facts to show that Walter Hunt did produce a sewing machine, but it was with two needles, whilst Fisher and Gibbons were the first to produce a machine with the needle and shuttle. He knew Elias Howe very well, and thought he had been hardly dealt with. He felt ashamed that Englishmen should have so oppressed a man who came to this country with a clever machine, which was, at all events, an important step gained in the desired direction. It was seldom, if ever, that any one man made a perfect machine as a whole. It was done by degrees, and sometimes generations passed away before the perfect machine was produced, but each individual who contributed a step to that end fulfilled his mission. They had great geniuses in this country as mechanicians, as well as in America. Having lived for fifteen years in the United States, he had made himself acquainted with both sides of the question, and he had formed his own opinion as to the reason that invention made greater progress in America than in this country. The *Journal of the Society of Arts*, *Newton's Journal*, and every publication upon scientific matters, were to be found upon the table of every scientific institution in America; and he fully subscribed to the statement which was made thirty-seven years ago, by Dr. Birkbeck, before the London Mechanics' Institution—that the American juniors were treading on the heels of the English seniors, and it was that statement which made him (Mr. Hodge) go to the United States. He was not sure that Howe did not get his first ideas from the beautiful drawings of Fisher and Gibbons' machine that were given in *Newton's Journal*, and it might be that that acute American, seeing that this embroidering machine could work patterns upon the surface of the fabric, thought it might be made applicable to the sewing of garments together. He thereupon introduced the feed motion, and brought his machine to this country. It was not perfect, but it was only fair to give him credit for what he really did. He had since perfected his invention, and a wonderful machine it was. He looked upon the many contributors to the improvement of these various machines as having fulfilled their mission, and to each he would accord the full credit which he deserved.

---

* See *Journal*, Vol. vii., p. 318.

Mr. Harry Chester would offer a remark, not upon the machine itself, but with regard to the health of the people—particularly the women who used it. No one could doubt that the substitution of work by these machines for the old kind of needlework was a great advantage to the country, and particularly with reference to the health of needlewomen; but it seemed to him that some improvement was still required, and would probably be made. He thought, from what he had seen of these machines, that the persons working at them must assume a stooping position, by which the spine was bent and the chest contracted, and that seemed to be the case with those accustomed to the use of the machine as well as with beginners. In looking at the subject of industrial pathology, it was very important to consider the position of the body in daily labour. Every shoemaker had a large hole in his chest from supporting the last between his bench and his body; washerwomen had swelled legs from standing constantly at the washing-tub; and he feared that the stooping position which was assumed in working these machines would have a prejudicial effect upon the spines of the operators. A curve was said to be the line of beauty, but no advocate of beauty would think it desirable that the spine of women should be bent forward, and it unfortunately happened that there was often a tendency in the spine to bend sideways also. Whatever they might think of a single curve forward, they certainly would not like to see a zig-zag form of spine in woman. He would call attention to this point with regard to these machines, and would suggest whether the work could be brought nearer to the front of the table, so as to be more under the eye of the worker, and so avoid the stooping position. It was a matter of importance, because there could be no doubt these machines would get more into use. They would not only be used by those who gained their daily bread by them, but if the ladies of London now had a stronger fancy than another it was devotion to the sewing machine, and as ladies did not readily give up anything they took up with zeal and devotion, the probability was these machines would soon be largely in use in the drawing-room as well as in the workshop.

Mr. Hodge said he should have liked Mr. Chester to have been with him in a visit he made at the commencement of the Crimean war, to a poor widow with two children, who took soldiers' coats to make from sub-contractors—no doubt a good many degrees down—at sixpence-halfpenny each, finding her own cotton and candle. Working from five o'clock in the morning till half-past eleven at night, her earnings amounted to sixpence-halfpenny. If the poor creature worked long at that rate she would not only have a hole in her chest, but would disappear altogether, and how little harm, in comparison, would be done by a few hours' work at a sewing machine.

Mr. Fothergill begged to explain that the reason why Fisher and Gibbons' machine was not proceeded with at the time was this—It was adapted to one of the most beautiful kinds of embroidery he had ever seen, viz., the lace falls of ladies' bonnets, which at the time went out of fashion. Mr. Fisher was then only 19 years of age, and being the nephew of Mr. Gibbons, who was the capitalist in the concern, that gentleman refused to advance more money to enable him to carry out his invention. By the death of his uncle, Fisher came into possesssion of funds, but the period had nearly elapsed for which the patent was granted. He, however, determined to make another attempt to introduce his machine, and also to adapt it to sewing. He made two or three machines upon a large scale, and set them to work, and ultimately produced those beautiful falls to which he had referred. He then brought his machine to London and made application to the Privy Council for the prolongation of his patent, but their lordships, considering he had not been an industrious patentee in making his invention of public utility, refused the application. In the first instance, Mr. Fisher being only a youth, had not the means of bringing out his machine, and in addition to that, the fashion for that description of work went out. The result was that he lost a large sum of money from the patent not having been prolonged.

Mr. Brodrick said it seemed to be a misfortune to any-one to profess to write the history of the time in which he lived, and an instance of this was afforded by the remarks of Mr. Fothergill. That gentleman had referred to the machine of Fisher and Gibbons, of Nottingham; he did not know its date. [Mr. Fothergill replied, 1844.] His principal reason for rising was, as an American, to say that if there was one thing which Americans prided themselves upon, it was the invention and perfecting of the sewing machine. Taking the date of Fisher and Gibbons' machine at 1844, it was antedated by that of Walter Hunt, in 1834. He had seen the machine which was rescued from the fire in John-street, New York, and it was subsequently produced as collateral evidence in an important trial of patent rights. The machine which Mr. Fothergill spoke of had a four-motion feed, upon which little stress was laid, but he (Mr. Brodrick) regarded it as the most important feature in the machine. That was the invention of Mr. A. B. Wilson, of the Wheeler and Wilson Sewing Machine Company, and it was Singer who invented the wheel-feed motion, and was the first to apply it successfully to the sewing machine. Any gentleman who had been in Washington must have seen in the

Patent Office there the various sewing machines that had been invented from the year 1834 to 1863, and he was proud to say there was scarcely a year during that period in which some improvement had not been made. The machine which Walter Hunt produced was deficient in not having the holes in the shuttle which were necessary to produce tension upon the lower thread. If he was not mistaken, that was one reason why Howe's machine succeeded so well. They must remember, in the history of all inventions—however great or small—the complete idea did not proceed from one man, and he questioned whether any man ever by himself conceived a scheme which entitled him to be called the original inventor in the strict sense of the term. There were several matters in which Howe claimed to be the inventor. Singer claimed to be the inventor of the appliances in his machine, and Wilson made the same claims with regard to his machine, but as to the forming of the lock stitch with the reciprocating shuttle, he thought there would not be any doubt that Howe succeeded, having taken up the invention where others had left it. He thought, however, the great value of Howe's invention was in the four or five holes in the side of the shuttle for increasing or decreasing the tension upon the thread; but for that there must have been a set screw at the end. In Walter Hunt's machine he thought this was the case. He had examined the matter very closely, and he thought without that invention of Howe's the shuttle must have failed. There was another machine which Mr. Alexander had overlooked, viz., a machine brought out by Bachelor, of New York, and Lerow and Blodgett, of Newark, New Jersey. The disc feed arrangement, with pins projecting so as to catch the fabric, was used in that machine; but previously to that there was no way of spacing the stitches, the plan for which was the invention of Mr. Bachelor, as also the feed-wheel, giving the addition of the screw at the side. He believed the date of that machine was 1848–9. With reference to the remarks which had fallen from Mr. Hodge upon the interest which was taken by American artisans in the scientific publications of the day, he (Mr. Brodrick) would state that there was a publication, known no doubt to many present, called the *Scientific American*, which was exclusively the organ of all information with respect to patented inventions, the specifications of which were accompanied by illustrations. With regard to what had been stated by Mr. Chester as to the injurious effects to be apprehended from the use of the sewing machine in the deformity of the spine, and the hole in the chest, he (Mr. Brodrick) would say that that gentleman was greatly mistaken. An inspection of the machines would show him that working at them for four or five hours would not produce any worse effects upon the spine or chest than the same number of hours' work by an accountant or clerk at a desk, and the height of the table from the floor was such that a person sitting at work on a chair did not require to assume an injuriously stooping posture. They had all at different periods of life been affected by the recital of Hood's "Song of the Shirt," but he was quite sure the workwoman of the sewing machine would bear favourable comparison with the workwoman who gave Hood his inspiration. Any person of ordinary skill could sit at the machine and perform with comfort more work in one hour, and of a better quality, than the best sempstress could accomplish in eight or nine hours. He knew instances of widows in America who had adopted these machines as a means of livelihood, and could, with their families, earn from two to three, and even five guineas per week. He hoped in this country these machines would prove as remunerative to the inventors as they were acceptable to those who used them.

Mr. **Mann**, following up the remarks that had been made by Mr. Chester, with reference to the influence of these machines on the health, would say that in many of the machines the work passed in front of the operator so close to the eye that there was no necessity for stooping, and a lady might sit at work at the machine as comfortably as in an easy chair. With regard to the objection that these machines were likely to throw a great many persons out of employ, or to lessen the amount of their earnings, there was no question amongst those who were best informed on the subject that, instead of starving sempstresses toiling with their needle for a bare crust, a person of ordinary skill might with the machine earn a comfortable subsistence, with far less physical labour and fatigue. Many single women, working ten hours a day in the City, earned from 12s. to 20s. per week. Not only was the rate of remuneration increased, but the amount of employment was also increased. He knew one firm who, when they commenced business, employed only four hands, but they were now using 60 sewing machines, and employed from 140 to 150 young women, besides a large staff of workmen.

Mr. **Salamon** would offer one or two remarks upon what had fallen from Mr. Fothergill as to Fisher and Gibbons having been the original inventors of the sewing machine. It raised the important question, whether the machine was, in fact, an English or an American invention. If the patent of Fisher and Gibbons had been prolonged, an enormous fortune would have been secured to those who were interested in it, but the eyes of the Lords of the Privy Counsel failed to recognise them as the inventors. It was only three weeks ago that he had the pleasure of entertaining Mr. Gibbons, and he then put the question to him direct, whether, when his machine was invented, he had any idea of a sewing machine? His reply was, "Not the slightest." He (Mr. Salamon) would say that was conclusive evidence that Fisher and Gibbons did not invent the sewing machine. That which they invented lacked all the essential features of a sewing machine. There was no feeding apparatus, no apparatus for making the tension of the thread, and many of the other appliances were wanting. He would call Mr. Alexander's attention to one or two mis-statements he had made. It so happened that the patent laws of this country legalised brain-theft, and in too many cases the real inventors not only were deprived of all benefit from their inventions, but their names were not even acknowledged or associated with them. Mr. Alexander had mentioned the name of Mr. Morey as the inventor of a sewing machine. The fact was, that gentleman was only a speculator in patents. Mr. Morey went to France, and got into prison at Clichy, where the rule was, that after a certain hour a prisoner might not put his head out of his cell, but as Mr. Morey disobeyed that rule, after having been challenged three times by the sentry, he was shot. To the great credit of the Emperor of the French, it should be stated that he immediately pensioned Mr. Morey's widow with £5,000.

Mr. **Brodrick** inquired what invention Mr. Morey claimed?

Mr. **Salamon** replied, the serrated plate, but he was not the inventor of the serrated plate, nor was Mr. Wilson, but the real inventor was Mr. J. H. Johnston. If Mr. Howe was a great inventor, Mr. Johnston was equally great, for without the feed the sewing machine was nothing. To use a poetical figure, Elias Howe constructed the plastic form, and Johnston stepped in and gave the figure life. Mr. Johnston was now reaping the benefit of his invention in America, for although his rights had been only so lately acknowledged, he was allowed to reap the benefit of his invention in that country; but he had not done so in England, because he had not put his £100 into the Patent-office. To give them some idea of the importance of the feed apparatus, he might say he heard Mr. Thomas state, in evidence on the trial of the action "Foxwell *v.* Thomas," that he had paid Mr. Morey £2,500 for a certain share in that feed apparatus, whilst Howe received only £200 for his whole invention. He (M Salamon) therefore objected to the name of Mr. Morey appearing upon the records of this Society as the inventor of the feed. It was only justice to state that Mr. Johnston was the inventor of it. There were seven machines exhibited before them this evening, and six of the seven were American. He would ask how it was that America almost monopolised the trade in sewing machines? His answer was that it was owing to the operation of the patent laws of this country, which enabled a man to hold a tight and rigid monopoly, and whether he would grant licenses or not was entirely at his own will. During the time that Mr. Thomas held his patent of the sewing machine, no fewer than 250 patents were taken out for so-called improvements, and the whole of that money lay dead in the patent offices, as not a single invention had been brought out. Were they to suppose that those 250 people paid their money for the mere pleasure of doing so? or were they to infer that some one prevented them from working out their inventions? He should like to see an account of the number of licences which Mr. Thomas granted during the time of his monopoly for the manufacture of the shuttle machine. He did not believe there was one, and the consequence was we were beaten by the Americans. In America every patentee was bound to license, but here he might shut up his inventions. There was another remarkable fact—the sewing machine was in use in this country by Mr. Thomas before it was in America. He believed there was no evidence of our mechanics making any improvements in those machines; but in America they found, that besides various improvements, there were virtually new machines produced by Grover and Baker, Wilcox and Gibbs, and Wheeler and Wilson, but our mechanics could not do this. It seemed strange that in this country of mechanical ability, they had not a single sewing machine worthy to compete with those of America. Although himself representing Elias Howe, as an Englishman he should be proud to see his country properly represented in this matter.

The Chairman said it now became his duty to propose a vote of thanks to Mr. Alexander for the interesting and important paper he had read to them—interesting, because he had shown them the result of so much mechanical skill and ingenuity; and important, because of the great economy of labour, and the manner in which the interests of a large number of industries were affected. Mr. Alexander had mentioned various inventors who had contributed to the perfection of this machine, if indeed it could now be considered perfect. There might be still further improvement; in point of fact, they might eventually have a loom which would complete a garment without sewing—like the stocking machine. But the history of these inventors was the history of men of genius who had applied their minds to the economising of labour. They had great conceptions, but they seldom or never perfected those conceptions in the first instance, but, as in all other things, they worked their way, step by step, through great difficulties, frequently not achieving successful results for themselves, although they conferred great benefits upon the public. He thought probably the reason why so many labour-saving machines were produced in America was, that the price of manual labour was so much greater there than in this country—more especially, he believed, the labour of sempstresses. They knew that profit was the great stimulus of invention, and no doubt it was difficult in America to get the necessary supply of labour, and hence the ingenuity of the people was devoted to the invention of machinery as a substitute for it. It was also to be remarked that the working people in America were more highly educated than were the same class in this country, and they had a more ready intelligence in seizing what was brought before them. That, he hoped, was an inequality which would not exist much longer. The mode in which Mr. Alexander had described the various sewing machines had made that which appeared extremely technical and difficult quite intelligible to anyone. No doubt when they saw a sewing machine at work it was difficult to comprehend, but when explained in the way Mr. Alexander had explained it, it became easily understood. It was remarkable that most really useful machines were, when properly understood, perfectly simple, for that which was complex had seldom been a mechanical success. He was quite sure they would agree in passing a cordial vote of thanks to Mr. Alexander for his valuable paper.

The vote of thanks having been passed,

Mr. Alexander, in reply upon the discussion, said that Walter Hunt had not that tension-appliance in his shuttle which was necessary for making a light stitch; and that, although Hunt had every opportunity afforded him of stating his case before the American judges, both in law and equity, judgment was given in favour of Howe, in all cases, he believed. If Hunt's was a really practical sewing machine, how came it that it lay dormant for fifteen years? Why was it never brought out? In answer to Mr. Fothergill's remarks on Fisher and Gibbons' machine, he (Mr. Alexander) stated that Fisher and Gibbons did not construct a really practical sewing machine, as such, before Howe; they never contemplated the construction of a *sewing* machine, although they might have produced some sewing by their machines at a later date. The machines, as specified by them lacked most of the requirements necessary to a sewing machine. In reply to Mr. Mann, he begged to state that his observation, that Bishop was the prior inventor, had reference only to the system of feeding the cloth by a lateral movement of the needle, and not to the arrangement of the machine, for which he gave Mr. Mann full credit as the inventor.

Mr. Fothergill said he himself saw a machine constructed according to Fisher and Gibbons' patent, and it sewed most effectually.

Mr. Alexander inquired when that was? He understood they reconstructed the machine and made it a sewing machine.

Mr. Fothergill could not state the date, but he had seen the machine at work.

The sewing machines of Messrs. Willcox and Gibbs, Wheeler and Wilson, Howe, Singer, Thomas, and Grover and Baker (Newton, Wilson, and Co.), as well as Messrs. Newton, Wilson, and Co.'s boudoir machine, were, by the kind permission of the proprietors, shown in operation during the evening. A model of the original sewing machine, as invented by Howe, was also on the table, having been kindly lent from the Museum of the Commissioners of Patents by Mr. Bennet Woodcroft, F.R.S. The woodcuts used to illustrate the paper were kindly lent by the proprietors of the *Practical Mechanics' Journal Record of the International Exhibition of* 1862.

The Secretary announced that on Wednesday evening next, the 15th inst., a paper by Mr. George Wallis, "On the New Art of Auto-Typography," would be read.

## Home Correspondence.

### FIRE-ENGINES.

Sir,—A copy of the *Journal of the Society of Arts*, of March 20th, 1863, having been handed to me, I perceive in the same a tabular statement of the actual results of the steam fire engines handed in by Mr. King, in connection with his paper on the "Suppression and Extinction of Fires." The digest of that table, I find, Mr. King has extracted from my official report of fires attended by Mr.

Hodge's Fire Brigade, during 1862 (a copy of which I beg to forward you), but he has perverted the actual truth of those trials—he has added 10 feet extra on the results of Easton and Amos's engine, and subtracted from the other makers' engines. I, therefore, beg to enclose you the truthful results of those trials, which materially alter his statement; and, in justice to the makers, I trust you will insert the same, with this letter of explanation, in your next number. I may add, that the results, as they appear, in my report, form which the enclosed table is an extract were submitted to the various makers and to many scientific gentlemen who were present at the trials, in order that they should be considered "facts." No other trials of the three makers' engines combined have taken place at any other place than Mr. Hodges' distillery; therefore, Mr. King's statement must be erroneous.

I am, &c.,
LEWIS M. BECKER, Lieut. H.F.B.
20, Pratt-street, Lambeth, April 4, 1863.

Table of Results of Trials of Steam Fire Engines, at Hodges' Distillery, during 1862.

| Engine Makers' Name. | Steam Pressure. | Vertical Heights. | Size of Jets. | Horizontal Distances. | Size of Jets. | Average water pressure. | Steam pressure of 50 lbs. in minutes. |
|---|---|---|---|---|---|---|---|
| | Lbs. | Feet. | In. | Feet. | In. | Lbs. | m. sec. |
| Easton, Amos, and Sons......... | 120 | 165 | 1¼ | 197 | 1½ | 140 | 11 30 |
| | 140 | 150 | 1½ | 190 | 1⅝ | | |
| Merryweather & Son ........... .. | 140 | 170 | 1¼ | 220 | 1¼ | 160 | 9 50 |
| | | 165 | 1⅜ | 210 | 1⅜ | | |
| | | 155 | 1½ | 194 | 1½ | | |
| Shand and Mason | 120 | 174 | 1¼ | 187 | ⅞ | 140 | 14 0 |
| | | | | 196 | 1 | | |
| | | | | 190 | 1¼ | | |

## STREET ILLUMINATIONS.

Sir,—Your correspondent Mr. H. C. White, in his letter inserted in your last *Journal*, (page 355), appears to regret, but without sufficient cause, that this subject has been noticed by the Society and a committee appointed for its consideration. Illuminations for joyful events are an old-fashioned custom followed out in old-fashioned ways, but that is no reason why they should be extinguished, or that they should not be carried out in a manner rather more in accordance with the progress of the age.

Mr. White complains of their causing over-much license and disorder, but so does every other assemblage of multitudes on joyful or other occasions, though the mode in which illuminations have been hitherto got up is not calculated to produce handsome general effects, as well as that avoidance of concentrated crowds in certain places for which the disgracefully narrow and crooked thoroughfares of our great metropolis, the richest in the world, are so very ill suited.

It is not in many parts of London that illuminations of private or public buildings, however splendid, can be seen to advantage, on account of the narrow streets in which they may happen to be placed. For example, the Cathedral of St. Paul's, with the exception of the dome and lantern, cannot be seen to advantage, from the total absence of clear space arround it; and the *façade* of Goldsmiths' Hall cannot be seen at all without lying down on your back in the opposite gutter, not twenty feet from the base of the building. There are few places—and none in the City—like Trafalgar-square, where illuminations such as that of the National Gallery can be seen so advantageously, especially if that eyesore, the Nelson Column, were not there, an object that always puts me in mind of those horrid fanatics of the dark ages, the Stylites, or pillar saints.

Partial illuminations, regulated only by the caprice of isolated individuals or companies, can never produce a grand general and pleasing effect, or be free from causing the accumulation of excessive crowds at certain spots; but if, when a general illumination was intended, a general subscription were entered into really to illuminate the great thoroughfares of the metropolis by means of festoons of gas lights, or any other uniform or varied device, the expense would be very much lessened, and no overcrowding would take place at any one spot, while a splendid promenade would be afforded to all those who might wish to walk or ride through the brilliantly lighted thoroughfares.

I throw out these crude suggestions merely with the view of eliciting something better from any of your correspondents who may have a fancy to take up this subject.

I am, &c.,
HENRY W. REVELEY.
Reading.

## MEETINGS FOR THE ENSUING WEEK.

Mon. ...R. Geographical, 8½. 1. Captain C. F. Hall, "Frobischer Strait proved to be a Bay, and on the fate of five men of the Arctic Expedition in the reign of Elizabeth." 2. Dr. Jno. Rae, "A Visit to Red River and the Saskatchewan."
Medical, 8½. Mr. Gay, "On Intestinal Stricture."
Tues. ...Medical and Chirurgical, 8½.
Civil Engineers, 8. 1. Discussion upon Mr. Miller's paper on "Structures in the Sea." 2. Mr. John Brunton, "Description of the Line and Works on the Scinde Railway."
Syro-Egyptian, 7. Annual General Meeting.
Ethnological, 8. Mr. John Crawfurd, "On the Antiquity of Man."
Royal Inst., 3. Prof. Marshall, "On Animal Mechanics."
Wed. ...Society of Arts, 8. Mr. George Wallis, "On the New Art of Auto-Typography."
R. Soc. Literature, 8½.
Royal Horticultural. Azalea and Rose Show, 1. Floral Committee, 10. Fruit Committee, 10.
Thurs...Royal, 8½.
Antiquaries, 8½.
Linnæan, 8.
Chemical, 8. Messrs. W. H. Perkins and A. H. Church, "On Derivatives of Naphthylamine."
Numismatic, 7.
Royal Soc. Club, 6.
Royal Inst., 3. Prof. Ansted, "On Geology."
Fri.......Philological, 8.
Royal Inst., 8. Mr. Frank Buckland, "On the Culture of Fish."
R. United Service Inst., 3. Mr. G. R. Burnell, "On the Progress of Naval Science during the year 1862."
Sat.......Royal Inst., 3. Professor Max Muller, "On the Science of Language."

## PATENT LAW AMENDMENT ACT.

◆

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, April 3rd*, 1863.]

*Dated 20th February*, 1863.

468. W. Clark, 53, Chancery-lane—Imp. in projectiles for ordnance. (A com.)

*Dated 27th February*, 1863.

551. H. Fehr, 63, Fenchurch-street — Imp. in the treatment of mineral oils.

*Dated 5th March*, 1863.

629. J. Elsey, Nottingham—Improved apparatus for the winding of lace on to the work roller in warp lace, bobbin net, or twist lace machines.

*Dated 9th March*, 1863.

645. H. Whittles, Milnrow, Lancashire—Imp. in machinery or apparatus for collecting the condensed steam or waste water from places where steam is used, and returning the same to the boiler.
647. J. Cowley, Oxford—Imp. in machinery or apparatus for manufacturing bricks, tiles, pipes, and mouldings.
649. J. Isherwood, Sharples, near Bolton, Lancashire—Imp. in working presses for making up yarn in bundles.
651. C. H. Lea, Shallowford, near Stone, Staffordshire—Improved apparatus for opening and closing the gates of railway crossings, which apparatus also acts simultaneously upon the signals.
553. P. Hugon, 56, Rue de l'Ouest, Paris, France—Improved machinery for obtaining and applying motive power.
657. W. E. Newton, 66, Chancery-lane—Imp. in the construction or laying of wooden floors. (A com.)

*Dated 11th March*, 1863.

661. F. Cooke, Denton, Lancashire—Certain imp. in the manufacture of hats or coverings for the head.

663. J. Cassell, La Belle Sauvage-yard—Imp. in moderator lamps to adapt them to the burning of petroleum and other mineral oils and hydro-carbons. (A com.)
665. W. R. Mulley, Plymouth—Imp. in sheathing iron ships, caissons, and other like structures.
671. J. Tomlinson, Rochdale—Imp. in machinery for opening twisted yarns and woven fabrics.
673. W. Rossetter, Accrington, Lancashire—Imp. in back beam warping machines.

*Dated* 12*th March*, 1863.

675. H. D. Taylor and J. W. Taylor, Huddersfield—Imp. in finishing woollen, worsted, and other fabrics, and in machinery or apparatus to be used therein.
676. L. Desens, Paris—An improved bath or bathing machine adapted for deep water.
677. W. Clark, 53, Chancery-lane—Imp. in breech-loading fire-arms. (A com.)
679. J. Polkinghorne, Redruth, Cornwall—Imp. in treating tin ores and in apparatus for treating ores and matters containing arsenic.

*Dated* 13*th March*, 1863.

681. J. Harris and J. Butler, Pontypool, and J. H. Fraser, Llanvrechva Upper, Monmouthshire—Imp. in machinery for rolling armour plates, bridge plates, boat plates, and other plates and bars of iron.
683. J. Taylor, Burnley, Lancashire—Imp. in fire bars and bearers.
685. W. H. Stubbe, New York, U.S.—Imp. in governors for marine and other engines.
687. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in fastenings suitable for portions of harness and other purposes. (A com.)

*Dated* 14*th March*, 1863.

689. W. E. Gedge, 11, Wellington-street, Strand—An improved plough. (A com.)
691. W. West, Tredenham-house, St. Blazey, Cornwall—Imp. in valves.
693. J. W. McCarter, Londonderry—Imp. in machinery for sawing or cutting wood.
699. J. Walworth, Bradford—Imp. in machinery or apparatus for washing or cleansing and drying Egyptian wheat, beans, and other kinds of grain or seeds.

*Dated* 16*th March*, 1863.

701. E. Oliver and G. Myers, Rotherham, Yorkshire—Imp. in apparatus for lowering and disengaging boats from vessels.
702. F. Hoyos, Paris—An improved stove or fire grate for heating, cooking, boiling, or other similar purposes.
703. T. W. Willett, 31, Charing-cross—Imp. in means for reefing and furling square sails of ships and vessels from the decks thereof.
705. G. P. Beley, Liverpool—Imp. in discharging projectiles below the water line of navigable vessels and other structures.
709. W. G. Eavestaff, Great Russell-street—Imp. in the construction of pianofortes.

*Dated* 17*th March*, 1863.

713. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the mode or means for framing pictures, looking glasses, and other objects. (A com.)
714. W. H. Emett, 8, St. George's-terrace, South Kensington—Imp. in processes for facilitating and combining the art of writing with engraving together on stone, applicable to maps, plans, specifications, and other lithography, which improvements are also available for retransfers to zinc or stone, or printing from original.
717. G. De Laire, Paris—Imp in the manufacture of brown colouring matters. (Partly a com.)

*Dated* 18*th March*, 1863.

719. W. Symington, Market Harborough, Leicestershire—Imp. in the process of, and apparatus used in, roasting and treating coffee and other organic substances.
720. W. C. Wild and J. H. Randel, Birmingham—A new and improved mode of inlaying gold and other metals in glass, and in a composition suitable for the manufacture of jewellery and other ornaments, buttons, and other similar articles.
721. W. Donbavand and D. Crichton, Manchester—Imp. in looms for weaving.
722. J. Roberts, and R. Naylor, Manchester—Imp. in organs, harmoniums, and pianofortes.
723. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of spoons and forks. (A com.)
725. W. E. Taylor, Enfield, near Accrington, Lancashire—Certain imp. in machinery for reeling, winding, warping, and beaming yarn.
729. T. Oldknow, Ashforth's Factory, Nottingham—Imp. in the construction of jacquards employed in bobbin net or twist lace machines.
732. A. Morel, Rue du Marche, Brussels—Imp. in apparatus for generating carbonic acid.
733. J. D. Welch and A. P. Welch, Gutter-lane, Luton, Bedfordshire—Imp. in bleaching and in reducing and brightening the colour or tone of dyed straw plaits and straw.

*Dated* 19*th March*, 1863.

735. E. Lever, Manchester—An improved composition for the coating and preservation of canvas and other materials to make them waterproof and non-inflammable.
741. G. H. Smith, Ipswich—Imp. in sewing machines.

*Dated* 20*th March*, 1863.

744. A. Barclay and A. Morton, Kilmarnock, Ayr, N.B.—Imp. in certain apparatus fer injecting and ejecting fluids.
745. J. Nield and T. A. Nield, Dukinfield, Cheshire—Imp. in core barrels.
746. R. A. Brooman, 166, Fleet-street—Imp. in machinery for beating and drying wool and other textile and filamentous substances. (A com.)
748. G. Wilson, Sheffield—An imp. in the manufacture of springs.
749. G. Coles, Gresham-street-west, and J. A. Jaques and J. A. Fanshawe—Imp. in machines or apparatus for washing or wringing clothes or fabrics.
750. C. Pryse and D. Kirkwood, Birmingham—Imp. in breech-loading fire arms, part of which improvements are also applicable to other descriptions of fire arms.
752. F. De Wylde, Trinity-square, Tower-hill—Imp. in the manufacture of cement from gypsum.

*Dated* 21*st March*, 1863.

754. F. Roberts and A. Roberts, 5, Victoria-cottages, Barton-terrace, Gloucester—Imp. in agricultural implements, and in apparatus for working the same.
755. C. De Groote, Brussels—Imp. in the construction of lamps with circular burners or wicks for the combustion of petroleum, schist, and other volatile oils, parts of said improvements being applicable to gas burners, night lights, and lamps burning spirits and animal oils.
760. F. Applegate, Bradford-on-Avon—Imp. in time indicators.

INVENTION WITH COMPLETE SPECIFICATION FILED.

786. Lieut. G. T. Key, R.N., Portsmouth—Imp. in fog and other signals.—25th March, 1863.

## PATENTS SEALED.

[*From Gazette, April 7th*, 1863.]

*April 6th.*

2698. J. Newnam.
2699. T. Beards.
2708. A. Forbes.
2710. H. D. P. Cunningham.
2711. J. K. Hampshire.
2712. J. Beale and M. A. Beale.
2714. C. F. Terry.
2728. A. V. Newton.
2731. L. Hosch.
2733. R. E. Green & J. Cockroft.
2738. D. S. Sutherland.
2739. E. Weallens.
2741. J. J. Shedlock.
2743. A. Vennedy.
2744. R. A. Brooman.
2746. J. Durrant.
2748. A. V. Newton.
2758. J. Gumbley.
2760. E. B. Wilson.
2765. E. Barlow, J. Clough, and F. Hamilton.
2781. C. de Bergue.
2784. J. B. G. M. F. Piret.
2790. W. Barningham.
2808. J. H. Johnson.
2812. J. Bentley.
2817. W. Clark.
2855. W. Clark.
2877. W. Clark.
2894. A. Peek.
2949. W. E. Newton.
2950. F. E. Sickels.
2952. W. Jenkins.
3046. C. Socin.
3166. W. Longley.
3175. A. V. Newton.
3234. G. T. Bousfield.
3483. F. Applegate.
67. L. Hull.
119. G. T. Bousfield.
155. G. T. Bousfield.
208. E. Strangman.
225. F. Tolhausen.
265. J. Mackenzie.

## PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, April 7th*, 1863.]

*April 1st.*

891. T. Aveling.
921. O. Vandenburgh.

*April 2nd.*

861. T. Ingram.
896. E. Heywood.

*April 4th.*

886. J. Hamer.

## PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, April 7th*, 1863.]

*April 4th.*

842. A. Morton.
843. W. Terry.

## LIST OF DESIGNS OF UTILITY REGISTERED.

| No. in the Register. | Date of Registration. | Title. | Proprietor's Name. | Address. |
|---|---|---|---|---|
| 4546 | March 26. | Malt Screen ... | Alfred Nash ... | Baldock-street, Royston, Herts. |
| 4547 | April 8. | An Apparatus for Protecting the Twist on the Stems of Jewellery Pins | R. G. and C. W. Phelps | Birmingham. |